
APPENDIX G

SUPPLEMENTAL MANUFACTURING DATA INFORMATION

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G-1. Frit Manufacturing Data Collection

No manufacturers were willing to supply complete frit manufacturing data as primary data for this study. Inventory data for the frit manufacturing process were obtained from secondary sources and from communications with industry representatives. Input data were derived from personal communication with an industry representative (Peer 2000) and output data were compiled from the U.S. Environmental Protection Agency's (EPA) *AP-42* publication (*Compilation of Air Pollutant Emission Factors*) (EPA 1997). The AP-42 data are provided for one ton of feed material, and it was assumed that the material efficiency is 100%, such that for each mass quantity of raw material input, the same mass quantity of frit is produced.

Limitations to these data are that a complete inventory, with all the information asked in the questionnaire for other manufacturing processes in this study, was not obtained. Personal communications were made to provide information on the major inputs to the process, based on a conversation taken place in June, 2000. The output data are based on a 1997 EPA publication. The publication date of the output data remains within the range of dates of primary data obtained in this study. Further, the frit manufacturing process is expected to be a relatively mature technology (compared to some LCD-related technologies), and 1997 data are expected to be representative of the monitors being studied in this project.

G-2. Printed Wiring Boards (PWBs) and Electronic Component Manufacturing Data Collection

Each display technology requires electronic printed wiring boards (PWBs) and their associated components such as integrated circuit (IC) chips, resistors, capacitors to operate the displays, independent of the computer's central processing unit. Therefore, the display PWBs and components are within the bounds of the analysis.

PWB and semiconductor (IC) manufacturing are highly energy and resource intensive processes. In purely a comparative analysis, we could consider eliminating the PWBs from the analysis since both the CRT and LCD display technologies use PWBs. However, the number of PWBs (4 major ones for LCDs and 2 for CRTs) and their makeup differ between the two technologies. For example, the AMLCD controller has more active parts because its addressing system is more complicated than the CRT. Therefore, exclusion of the PWB manufacturing process was chosen to be included in the scope of this project. In addition, beyond the goal of a comparative analysis between CRT and LCD, this study is intended to provide baseline data for each individual technology such that improvement assessments can be considered when evaluating the entire life cycle of a particular monitor. This provides another reason to include PWB manufacturing in the scope. However, due to the importance of collecting primary data for the other major display components (e.g., CRT tube and LCD panel/module manufacturing), a lower priority was given to obtaining PWB data.

Given the lower priority for PWB and component data collection, questionnaires were not sent to multiple PWB and component manufacturers. Alternatively, data were obtained from an industry contact knowledgeable in PWB manufacturing (Sharp 2000). PWB component manufacturing data were not obtained; however, materials use as well as energy consumption from manufacturing PWB components are expected to be small in comparison to the overall manufacturing requirements for the CRT and LCD monitors; therefore, lack of PWB component manufacturing data is not expected to have a significant impact on the results.

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